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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,899	03/24/2004	Amir Azordegan	P1108	5358

7590 04/21/2005

Deborah W. Wenocur
4057 Amaranta Ave.
Palo Alto, CA 94306

EXAMINER	
BERMAN, JACK I	

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 04/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Notice of Allowability	Application No.	Applicant(s)	
	10/807,899	AZORDEGAN ET AL.	
	Examiner	Art Unit	
	Jack I. Berman	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.

2. ☒ The allowed claim(s) is/are 1-20.

3. ☐ The drawings filed on _____ are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 11/1/2004
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Jack Berman
JACK BERMAN
PRIMARY EXAMINER

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Deborah Wenocur on April 14, 2005.

The application has been amended as follows:

IN THE CLAIMS:

15. (Amended) A method for stabilizing CD measurements of a photoresist feature on a surface of a semiconductor wafer portion in a CD-SEM, comprising the steps of:

installing said wafer portion in said CD-SEM;

performing said CD measurements by measuring secondary electrons emitted due to an incident electron beam, said measuring being performed by interspersing a flooding step at a first beam Landing Energy (LE), a first Beam Current (BC) and a first magnification, with an imaging step at a second beam Landing Energy, a second Beam Current, and a second magnification, said first beam Landing Energy and said second beam Landing Energy being independently adjusted to prevent charging of said photoresist feature in such a way as to reduce measured shrinkage of the photoresist.

18. (Amended) The method of claim 16, further including, before said step of performing said CD measurements by measuring secondary electrons emitted due to an incident electron beam, the step of exposing said ArF resist feature to a pre-dose of energetic electrons from an electron

beam at a beam Landing Energy (LE), a Beam Current (BC) and a magnification, for a specified time period wherein said pre-dose is sufficiently high to pre- shrink said ArF resist feature such that subsequent CD measurements of said ArF resist feature remain substantially stable ~~according to the method of claim 8~~.

19. (Amended) The method of claim 16, further including, before said step of performing said CD measurements by measuring secondary electrons emitted due to an incident electron beam, the step of exposing said ArF resist feature to a pre-dose of energetic electrons from an electron beam at a beam Landing Energy (LE), a Beam Current (BC) and a magnification, for a specified time period wherein said pre-dose is sufficiently high to pre- shrink said ArF resist feature such that subsequent CD measurements of said ArF resist feature remain substantially stable and wherein said pre-dose is on the order of 1.5 E-10 Coulomb ~~according to the method of claim 9~~.

20. (Amended) The method of claim 16, further including, before said step of performing said CD measurements by measuring secondary electrons emitted due to an incident electron beam, the step of exposing said ATF resist feature to a pre-dose of energetic electrons from an electron beam at a beam Landing Energy (LE), a Beam Current (BC) and a magnification, for a specified time period wherein said pre-dose is sufficiently high to pre- shrink said ArF resist feature such that subsequent CD measurements of said ArF resist feature remain substantially stable wherein said step of exposing said ArF resist feature to a pre-dose of energetic electrons from an electron beam comprises interspersing a flooding step at a first beam Landing Energy (LE), a first Beam Current (BC) und a first magnification, with an imaging step at a second beam Landing Energy,

a second Beam Current, and a second magnification, and beam multiplexing wherein said beam multiplexing is operated in charge compensation mode wherein imaging is performed at a LE value having an electron yield greater than 1, and flooding is performed at a LE value having a yield less than 1, such that the negative charge accumulated during the flood step is adjusted to balance the positive charge accumulation during the imaging step ~~according to the method of claim 12~~.

The following changes to the drawings have been approved by the examiner and agreed upon by applicant: The shading in the background of the graphs in Figures 3a, 3b, 3c, and 6b will be removed; reference numerals 26 and 28 in Figure 3b will be changed to 20 and 22, respectively, in order to match the specification; and reference numerals 20, 22, and 24 in Figure 3c will be changed to 24, 26, and 28, respectively, in order to match the specification. In order to avoid abandonment of the application, applicant must make these above agreed upon drawing changes.

The following is an examiner's statement of reasons for allowance: While both Kim et al. and Ke et al. teach that it is known in the art to cure an ArF resist with electron beams before taking measurements in a CD-SEM, neither of these references, or any other available prior art, teaches to perform this curing in the CD-SEM itself. In fact, at lines 14-25 in column 3, Kim et al. teaches that one of the objections to such electron beam curing is the extra equipment and additional wafer handling required. The use of the CD-SEM itself to perform this curing, as claimed in the instant application, obviates this rejection. The method claimed in Claim 15 of the

instant application for adjusting the landing energies of two electron beams to prevent charging of the photoresist features in such a way as to reduce measured shrinkage of the photoresist differs from the similar method disclosed in the Masnaghetti et al. patent, cited in the specification, because Masnaghetti et al. teaches to adjust the landing energies of two electron beams to prevent charging of the photoresist features in such a way as to improve an image quality parameter (see, e.g., lines 51-58 in column 2 of the patent). The level of charge compensation required to prevent shrinkage is not necessarily the same level required to improve image parameters and nothing in the prior art teaches to use the level of charge compensation required to prevent shrinkage as a criterion to adjust the landing energies of the two beams.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack I. Berman whose telephone number is (571) 272-2468. The examiner can normally be reached on M-F (8:30-6:00) with every second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jack I. Berman
Primary Examiner
Art Unit 2881

jb
4/14/05